New Mexico Environment Department

Surface Water Quality Bureau

Quality Assurance Project Plan

for

Stream Restoration on the Upper Rio San Antonio
Carson National Forest – Tres Piedras Ranger District, NM

Clean Water Act Section 319, EPA Grant Number 99610117
NMED Project Number 17-W

Submitted by:

New Mexico Environment Department
Surface Water Quality Bureau
1190 Saint Francis Drive
Santa Fe, NM 87502

APPROVAL PAGE

QUALITY ASSURANCE PROJECT PLAN
for
Stream Restoration on the Upper Rio San Antonio

Approvals:

New Mexico Environment Department Surface Water Quality Bureau

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Nelly Smith Chief State & Tribal Programs Section, WQPD, EPA Region 6

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ACRONYMS

CNF	Carson National Forest
CWA	Federal Water Pollution Control Act as amended 1972 (aka “Clean Water Act”)
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
HQCWAL	High Quality Cold Water Aquatic Life Use
NAWCA	North American Wetlands Conservation Act
NMED	New Mexico Environment Department
PC	Primary Contact
QAPP	Quality Assurance Project Plan
QA	Quality Assurance
QAO	Quality Assurance Officer
QC	Quality Control
QAPP	Quality Assurance Project Plan
RERI	River Ecosystem Restoration Initiative
SOP	Standard Operating Procedures
SWQB	New Mexico Environment Department Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
WEG	WildEarth Guardians
WPS	Watershed Protection Section, Surface Water Quality Bureau
WQPD	Water Quality Protection Division

1.0 PROJECT MANAGEMENT

1.1 Distribution List

The distribution list, project roles and responsibilities for this project are outlined below in Table 1. The Quality Assurance Officer (QAO) will ensure that copies of this QAPP and any subsequent revisions are distributed to individuals who have signature authority to approve this QAPP. The SWQB 319 Project Officer will ensure that copies of the approved QAPP and any subsequent revisions are distributed to all other project personnel listed in Table 1. All members of the distribution list who do not have signature authority to approve this QAPP will review the QAPP and sign the Acknowledgment Statement prior to initiating any work for this project. The signed Acknowledgement Statements (electronic or hard copy) will be collected by the SWQB Project Officer and will be given to the QAO for filing with the original EPA approved QAPP.

Table 1
Distribution List and Project Roles and Responsibilities

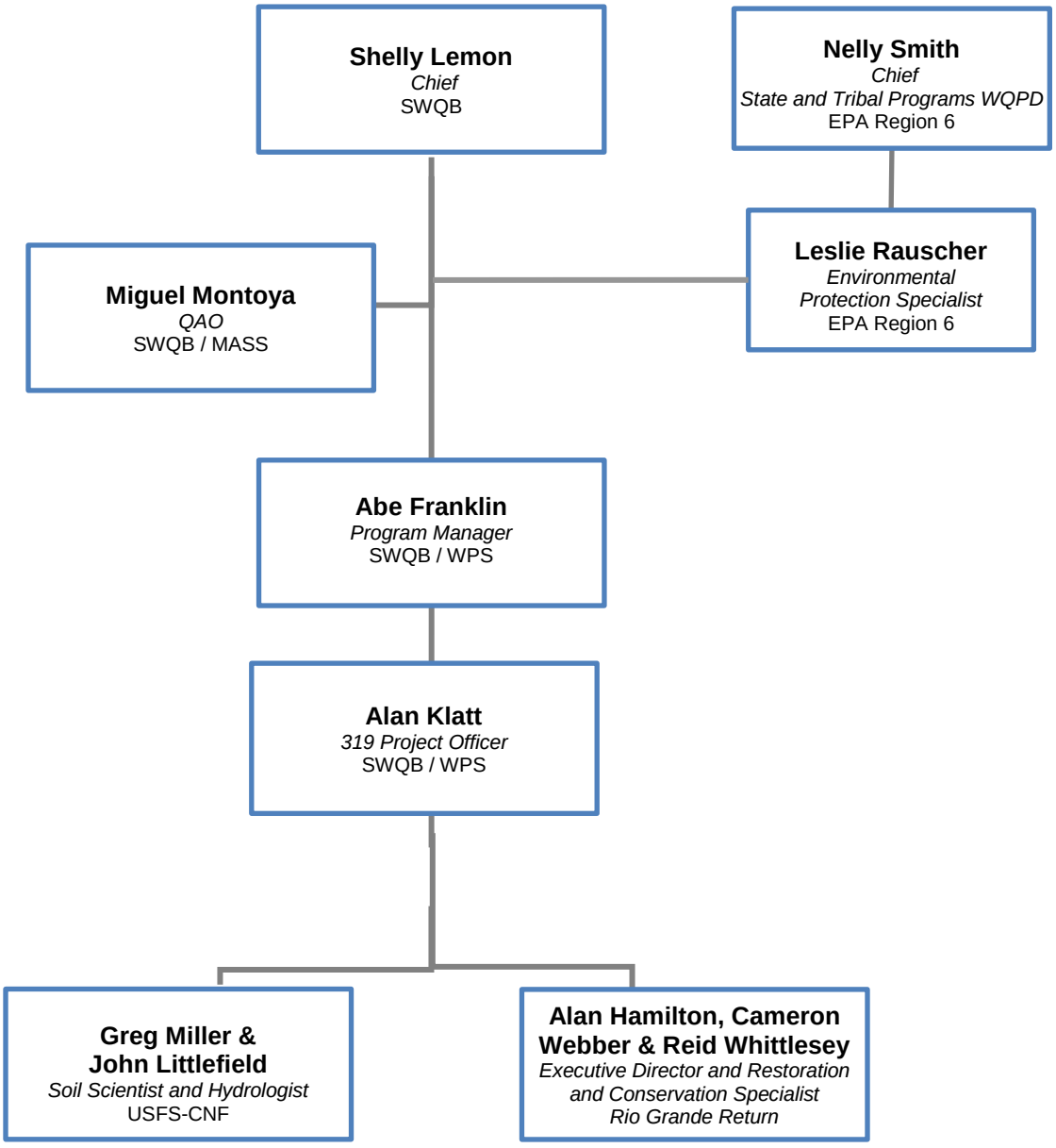
Name	Organization	Position/Role	Responsibility for	Contact Information
Abe Franklin	SWQB	WPS Program Manager	Reviewing and approving QAPP; managing project personnel and resources	(505) 827-2793 abraham.franklin@state.nm.us
Miguel Montoya	SWQB	Quality Assurance Officer	Reviewing and approving QAPP	(505) 476-3794 miguel.montoya@state.nm.us
Alan Klatt	SWQB	319 Project Officer	Assist in QAPP preparation, report preparation; act as liaison between cooperators and project coordinator; maintain project files; and assist in data collection.	(505) 827-0388 alan.klatt@state.nm.us
Greg Miller	USFS-CNF	Soil Scientist, Watershed Program Manager	Provide administrative and landowner support, assist in data collection	(575) 758-6200 x6251 gregory.miller@usda.gov
John Littlefield	USFS-CNF	Hydrologist	Provide administrative and landowner support, assist in data collection	(575) 758-6311 jmlittlefield@usda.gov
Alan Hamilton	Rio Grande Return	Executive Director and Project Coordinator	Project Management, Provide data, assist in data collection	(505)-670-2621 alan@riogrande return.com

Reid Whittlesey	Rio Grande Return	Restoration and Conservation Specialist	Provide, collect, and report data	(505)-670-2621 reid@riograndereturn.com
Cameron Webber	Rio Grande Return	Restoration and Conservation Specialist	Provide, collect, and report data	(505)-670-2621 cameron@riograndereturn.com
Leslie Rauscher	EPA	Environmental Protection Specialist	Review and approve QAPP	(214) 665-2773 rauscher.leslie@epa.gov
Nelly Smith	EPA	Chief, State and Tribal Programs Section	Review and approve QAPP	(214) 665-7109 smith.nelly@epa.gov

1.2 Project Organization

The SWQB Quality Management Plan (NMED/SWQB 2020) documents the independence of the QAO from this project. The QAO is responsible for maintaining the official approved QAPP. A project organizational chart (Figure 1) displays hierarchy of the project.

Figure 1
Organization Chart
Rio San Antonio Water Quality Improvement Project



1.3 Problem Definition/Background

The purpose of this Quality Assurance Project Plan (QAPP) is to document the results of the Stream Restoration on the Upper Rio San Antonio (the Project) both pre-and post-project implementation.

Background of the Rio San Antonio Water Quality Improvement Project

The Rio San Antonio (Montoya Canyon to headwaters, 17.92 miles, Assessment Unit: NM-2120.A_901) is listed under the Clean Water Act 2018 – 2020 303(d)/305(b) Integrated Report[1]. The state lists the segment as being impaired for dissolved oxygen, temperature, and *Escherichia coli* (*E. coli*) which cause the stream to not meet its designated use for Primary Contact (PC) and High Quality Cold Water Aquatic Life (HQCWAL). The Integrated Report lists the possible sources of impairment as waterfowl, livestock (grazing), recreational pollution sources, sources unknown, wildlife other than waterfowl, road/bridge runoff, and streambank modification or destabilization.

The proposed Project segments are located on the Carson National Forest and the primary land uses have been livestock grazing and recreation, with historic logging. Grazing in the riparian corridor has impacted the growth and regeneration of native woody species, influencing both shade coverage through reducing the overstory canopy and bank stability by a reduction in root mass[2]. Having overstory canopy on the stream banks is important in maintaining water temperature within the acceptable range, especially during the summer months when solar exposure is most severe. Root mass in the banks and downed large woody debris within the channel reduce widening of the channel and promote complex pool formation, characteristics that both lead to lessened solar exposure and also contribute to higher dissolved oxygen (DO) content. More dissolved oxygen can be held in cold water compared to warm water.

The 2004 Total Maximum Daily Load (TMDL) for the Upper Rio Grande Watershed[3], which includes the Rio San Antonio, indicates that temperature data collected from 2002 and 2003 exceeded HQCWAL criteria 255 of 1,446 times (18%), with a maximum recorded temperature of 27.1°C. The summer of 2003 exceeded HQCWAL criterion 350 of 1,446 times (24%) with a maximum daily temperature of 27.6°C. The TMDL states that the Rio San Antonio exceeds the solar loading allocation at a rate of 127.82 j/m²/s, needing to be reduced from its current 275.30 j/m²/s to 147.48 j/m²/s to meet the HQCWAL water quality standard. To achieve this reduction, the TMDL suggest the current canopy cover of 16.0% will need to be increased to approximately 55%. The Rio San Antonio has no point sources for temperature, therefore the load reduction goals must be met through addressing nonpoint sources of temperature pollution. The WBP identifies cattle and wild ungulate grazing, which has reduced riparian vegetation and led to increased bank erosion resulting in channel widening, as the primary nonpoint source of pollution that affects water temperature through increased solar loading. The width to depth ratio is high in the Rio San Antonio and channel depth and riffle/pool complexity is low.

EPA funding under Section 319 of the Clean Water Act provides resources to implement activities described in the *Stream Restoration on the Rio San Antonio* (2020) Project Work Plan*.* The work plan states, “The exclosure fencing and improved riparian conditions are expected to reduce stream temperature and E. coli loading”. The increase in riparian vegetation shading and riparian function will help alleviate solar loading, thereby moderating and reducing water temperatures.

[1] https://www.env.nm.gov/surface-water-quality/303d-305b/
[2] https://www.env.nm.gov/surface-water-quality/accepted-wbp/
[3] https://www.env.nm.gov/surface-water-quality/tmdl/

Objective

The goals of the Project are to monitor and evaluate the effectiveness of the restoration projects in the Rio San Antonio watershed, which have been designed to reduce stream temperature by increasing riparian vegetation shading throughout the project reach, improving floodplain connectivity, and improving aquatic habitat. Beaver dam analogs (BDAs) (up to 10 BDAs for this project) and post-assisted log structures (PALS) (up to 20 PALS for this project) will slow water velocities and help reconnect floodplains. Increased floodplain connectivity is known to elevate shallow water tables and increase hyporheic flow which will contribute to increased baseflows that will return cooler water back into the stream in later summer months when air temperatures are typically at their greatest and stream flows at their lowest.

BDAs are human-made structures that mimic the form and function of natural beaver dams. They are a permeable, channel-spanning structure with a constant crest elevation, constructed with a mixture of woody debris and fill material to form a pond and mimic a natural beaver dam. BDAs cause aggradation that increases the elevation of the channel bed, reducing the vertical distance to the floodplain that can enable flows to reach floodplain during higher flow events. PALS consist of woody materials of various sizes pinned together with untreated wooden posts driven into the substrate to mimic natural wood accumulations. PALS can be used to achieve a range of restoration outcomes such as high flow refugia for aquatic species, increasing channel-floodplain connectivity, increasing physical complexity of fluvial system, and channel incision recovery by promoting aggradation[4].

Improved floodplain connections can be shown with increased wetted perimeter measurements, a derived characteristic of the channel cross-section. The project will also include the construction of four cattle and elk exclosures (totaling approximately 5 acres), 1,000 willow transplants, and 50 cottonwood transplants.

Monitoring these resultant changes within the project reach will be addressed by the following monitoring methodologies:

1. Monitoring changes in stream canopy cover shading toward the goal of increasing the estimated 16.0% existing cover[5] towards 55% (*The 2019-2021 NMED-SWQB Standard Operating Procedures For Physical Habitat Measurements*);
2. Establishing permanent photo point locations to visually and qualitatively monitor changes to the stream and riparian system following *Stream Channel Reference Sites: An Illustrated Guide to field Technique* by Harrelson et al (1994);
3. Monitoring changes in stream geomorphology by installing and measuring permanent stream cross-sections. The geomorphological condition, wetted perimeter, will be assessed using standard cross section measurements described by Rosgen, (1996) and cited in Harrelson, et al. (1994).

[4] Wheaton J.M., Bennett S.N., Bouwes, N., Maestas J.D. and Shahverdian S.M. (Editors). 2019. Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Version 1.0. Utah State University Restoration Consortium. Logan, UT. Available at: http://lowtechpbr.restoration.usu.edu/manual

[5] Total Maximum Daily Load (TMDL) for the Upper Rio Grande Watershed (Part 1)

1.4 Project/Task Description

Description

The Project will collect data by establishing baseline conditions and monitoring post-implementation changes to evaluate the success of the restoration projects and to apply ongoing adaptive management techniques throughout the project duration.

Schedule

Monitoring is planned for two years, beginning with baseline data collection in 2020, and continuing through post implementation monitoring in 2021 which will be conducted by Rio Grande Return's restoration and conservation specialists. Monitoring will continue into 2022 as required by the U.S. Army Corps of Engineers' Nationwide Permit's monitoring requirements. Continued monitoring will be conducted in collaboration between NMED-WPS staff and Carson National Forest (CNF) staff. Data will be examined each year to determine the effects of the project on water quality, with the understanding that some effects may take longer to detect due to the lag time of vegetation growth rates and ecological response. Because of this, permanent photo points will be established in 2020 to document each BDA, PALS, and exclosure to document visual changes in vegetation and floodplain connectivity within the project area.

Table 2.
Schedule of Metrics and Methods

Metric/Methods	Summer/Fall 2020	Summer/Fall 2021	Summer/Fall 2022	Summer/Fall 2022	Summer/Fall 2022
1. Stream Canopy Cover: Densiometer measurements will be taken to measure pre- and post-project vegetation shading of the stream surface for the exclosure areas only. Data collection methodology will be done in accordance with the Percent Canopy Cover section in the *2019-2021* NMED/SWQB Standard Operating Procedures (SOP) for Physical Habitat Measurements.	**X**	**X**	**X**	**X**	**X**

2. Visual Stream and Riparian Condition: Permanent photo points will be established throughout the project reach prior to project implementation and monitored through project completion. Methodology will be done in accordance Harrelson et al (1994).	**X**	**X**	**X**	**X**	**X**
3. **Stream Morphology:** Cross-sectional profiles will be established and monitored pre and post construction at selected areas throughout the project reach (7 representative cross sections). Methodology will be done in accordance with Rosgen (1996) and cited in Harrelson, et al. (1994).	**X**	**X**	**X**	**X**	**X**

Location

The project area is in the Rio San Antonio watershed on the Carson National Forest (Figure 2).

Table 3
Rio San Antonio Effectiveness Monitoring Stations

Station	Description/Rationale	Latitude and Longitude	Previous Data
RSA – UPPR4	Project area focusing on exclosure fencing and plantings	N 36.878642 W -106.241018	No
RSA – UPPR3	Project area focusing on BDAs and PALS	N 36.856259 W -106.186096	No

The stations identified in Table 3 have been selected to monitor and evaluate the effectiveness of the restoration projects in the Rio San Antonio watershed. Additional stations may be added in the future based on the experience and professional judgment of Rio Grande Return in close coordination with SWQB-WPS staff and CNF staff to best evaluate and determine the effectiveness of restoration implementation locations. Additional locations may include stations for canopy cover, geomorphology, and photo point monitoring. The data will all be collected in accordance with the procedure stated in this QAPP.

Table 4
Waterbody Attributes for the Rio San Antonio

Waterbody	Assessment Unit Name	Assessment Unit ID and WQS	8 digit HUC name	12-digit HUC	12-digit HUC Name
Rio San Antonio	Rio San Antonio – Montoya Canyon to headwaters, 17.92 miles; AU: NM-2120.A_901	NM-2120.A_901 20.6.4.123 NMAC	Conejos River	130100050301	Upper Rio San Antonio

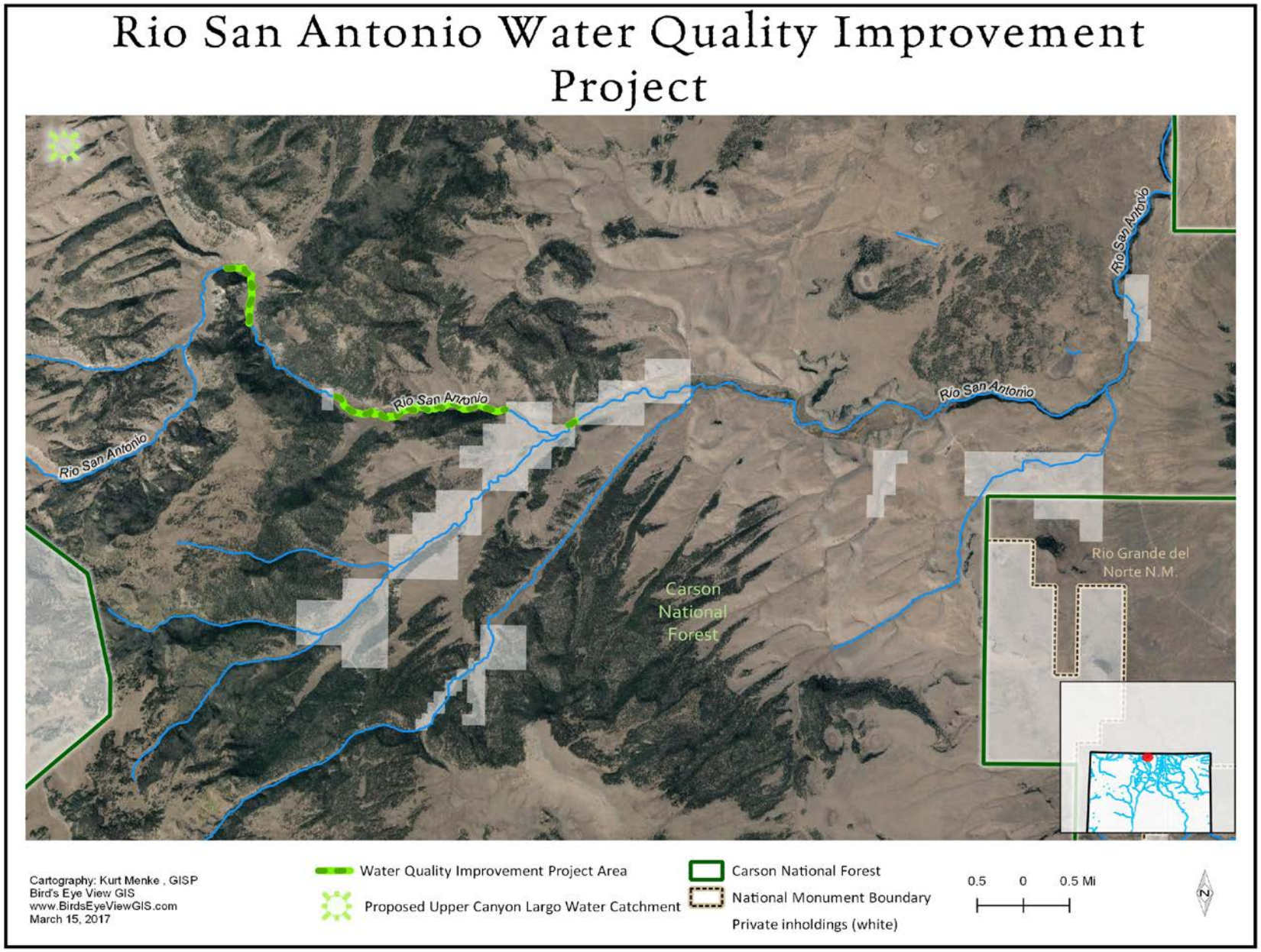


Figure 2: The first section in green (map left) will focus on exclosures. The next downstream section in green (to the right) will focus on BDAs and PALS.

1.5 Quality Objectives and Criteria for Measurement Data

Question/Decision

The Project is intended to answer the following question: Have the restoration activities in the Upper Rio San Antonio watershed improved floodplain connectivity and increased riparian canopy?

Stated as a decision: The information gathered by the Project will be used to decide whether the restoration activities in the Rio San Antonio watershed have improved conditions that would be expected to be followed by lowered water temperatures and alleviated solar loading. Both qualitative and quantitative data will be collected, and where applicable modeled in SSTEMP and/or statistical software to determine if goals are being achieved at a later time by NMED-SWQB, outside of this project. SWQB Monitoring Teams will continue monitoring at station 27RSanAn031.5 and the USFS will also continue implementing restoration projects, which overtime are expected to improve water quality conditions which would be expected to be confirmed by future NMED water quality monitoring efforts.

Data Quality Objective (DQO)

The quality of the data will be adequate to provide a high level of confidence in determining whether the restoration activities in the Upper Rio San Antonio watershed have increased riparian canopy and floodplain connectivity on the Rio San Antonio.

Measurement Quality Indicators

The measurement quality objectives will be sufficient to achieve the Data Quality Objective (DQO) and will be in conformance with those listed in the this QAPP. The Data Quality Indicators listed in the SWQB's QAPP (NMED/SWQB 2018) and applicable to the data collected for this project are precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity.

DQI	Determination Methodologies
Precision	In order to increase precision of data collection in the field, a minimum of two field staff will be present during all data collection activities to ensure adherence to this QAPP and referenced methods. Ideally, to assure consistency and thereby precision, the same personnel will carry out the responsibilities of collecting, recording and analyzing data
Bias	Bias will be reduced by using professional and experienced staff to collect and analyze data
Accuracy	The basis for determining accuracy will be based on the sensitivity of the field equipment and the staff's expertise of the survey method for collecting data and ensuring the accuracy of the equipment being used is within the acceptable range of a particular survey
Representative	Data collection will be representative of the project area specifically pre- and post-restoration areas.
Comparability	The data collected both before and after implementation of the workplan will be collected using the same methods in order to be comparable and ascertain the effectiveness of the project. In addition, the methods used for this project are similar to those used in other restoration projects with established quality assurance

	mechanisms for comparability so that results of this project may be comparable with other studies of a similar nature.
Completeness	Data collection will include all parameters at each field survey, as described in Table 2, to ensure completeness and usability of the data.
Sensitivity	Sensitivity is ensured based on the manufacturer's specified range and accuracy of the equipment being used and the expertise of the field staff to use and apply data collection methods in a manner that minimizes subjectivity or gross data collection errors.

1.6 Special Training/Certification

Project construction and the first two seasons of monitoring will be implemented by Rio Grande Return. The third and possibly fourth and fifth (if required by the USACE for CWA compliance) seasons of monitoring will be conducted by CNF and NMED staff . No special training/certification is required. All project personnel have natural resource backgrounds and prior experience conducting the type of monitoring that is included in this QAPP

1.7 Documents and Records

The SWQB Project Officer will make copies of this approved QAPP and any subsequent revisions available to all individuals on the distribution list who do not have signature authority for approving the QAPP.

When changes affect the scope, implementation, or assessment of the outcome, this QAPP will be revised to keep project information current. The Project Officer, with the assistance of the QAO, will determine the effects of any changes to the scope, implementation, or assessment of the outcome on the technical and quality objectives of the project. This Project Plan will be reviewed annually by the SWQB Project Officer to determine the need for revision.

All field sheets will be verified before leaving the field, any data captured on a global positioning system (GPS), camera, smart phone, tablet, or laptop will be downloaded and saved to a Rio Grande Return or NMED computer.

All project documents including this QAPP, signed acknowledgement statements, protocol documents, field notebooks, calibration records, validation and verification records, recorded field data, in hard copy or in electronic form, and QC records will be maintained, and protected by Rio Grande Return. A copy will be made of all data and stored separately from the original data to ensure the integrity of the raw data set. Rio Grande Return and NMED will also prepare and maintain copies of project interim and final reports. All raw data, project documents and reports will be submitted quarterly to the SWQB 319 Project Officer by Rio Grande Return.

The QAPP, signed QAPP acknowledgement statements, project documents and all reports will also be maintained by the SWQB Project Officer in the project file at the SWQB in Santa Fe, NM.

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Design

Canopy data, through the use of a spherical densiometer, will be collected pre and post-construction at each riparian exclosure. Baseline canopy data will be used to demonstrate project effectiveness towards increasing shade which the TMDL has shown to be needed in order to reach the target load.

Seven cross-sectional stream surveys, at representative BDA and PALS locations, will be conducted pre and post-construction to measure wetted perimeter and to demonstrate project effectiveness towards increasing floodplain connectivity. Exact locations will be determined in the field by Rio Grande Return and NMED staff and will be monumented with capped rebar (or similar). Data will not be collected immediately following events that cause visible changes to channel geomorphology, such as a large flood or scour event.

Permanent photo point locations will be established to document each exclosure, BDA, and PALS. Photo documentation will occur pre and post-construction. Azimuth, elevational readings and GPS coordinates will be taken during initial permanent photo point establishment to ensure repeat photo observations are recreated accurately, if possible photo point location will be monumented with capped rebar (or similar). Photo points will be used to capture changes over time at permanent photo point locations. Metadata associated with photo documentation will include date, time, azimuth, elevation, GPS coordinates, weather, precipitation totals over past 60 days, photographer as well as any remarkable notes.

2.2 Sampling Methods

All data collected will be done in accordance with this QAPP, SWQB SOPs and the procedures listed in the Sampling Methods section of this QAPP.

Specifics sampling methodologies for each monitored parameter are provided below:

1. **Stream Morphology** cross-sectional data will be collected in accordance with Rosgen (1996) and Harrelson, et al. (1994) to determine wetted perimeter values to indicate floodplain connectivity at seven representative BDA and PALS locations . The wetted perimeter is defined as the total length of the bed and bank that is in contact with the water in the channel.

2. **Percent Canopy Cover** will be determined using a spherical densiometer following the 2019-2021 NMED-SWQB Standard Operating Procedures for Physical Habitat Measurements. Canopy cover data will be evaluated to determine if there was an increase in cover within the exclosure areas.

3. **Visual Stream and Riparian Condition** photo documentation will be collected at permanent photo point locations for each exlosure, BDA, and PALS location in accordance with *Stream Channel Reference Sites: An Illustrated Guide to Field Technique* (Harrelson, et al 1994).

2.3 Sample Handling and Custody

Because there are no plans to collect water or soil samples for laboratory analysis, there is no handling requirements.

2.4 Analytical Methods

Because there are no plans to collect water samples, no analytical methods are needed.

2.5 Quality Control

For this project, the QC activities are those needed to assess and demonstrate the reliability of the data. The quality of the data is controlled by using standardized methods that are documented in this QAPP. All personnel who collect, manage or manipulate data will be familiar with and implement the procedures identified in this QAPP.

Channel cross-sections will demonstrate quality control by following all procedures described by Rosgen (1996) and cited in Harrelson, et al. (1994). Personnel will complete all portions of procedures identified for conducting cross-sectional surveys.

Canopy coverage has the greatest potential for observer error and bias. Quality control will be strengthened by following the procedures described in 2019-2021 NMED/SWQB Standard Operating Procedures for Physical Habitat Measurements, SOP 5.0.

2.6 Instrument/Equipment Testing, Inspection and Maintenance

The primary equipment needing maintenance, testing and inspection are the equipment used for stream morphology surveys. Stream morphology equipment (spherical densiometer, measuring tape, ruler, clinometer, survey rod, flow meter etc.) will be tested and maintained according to manufacture specification. Stream morphology equipment will be inspected prior to use by either Rio Grande Return or NMED personnel.

2.7 Instrument/Equipment Calibration and Frequency

As long as the survey equipment is in good working order, no calibration is required. Survey equipment will include a laser level, tape measure, and survey rod. Other equipment includes spherical dome densiometer, camera, and GPS device.

2.8 Inspection/Acceptance of Supplies and Consumables

There are no plans to use consumables in the calibration of thermographs.

2.9 Non-direct Measurements

There are no plans to use data from non-direct measurement sources.

2.10 Data Management

Field data, such as densiometer measurements and cross-sectional survey data will be recorded on field sheets and field notebooks. Examples of acceptable field sheets are available on pages 4 and 8 on SWQB's Physical Habitat Field Data Sheets[6]. These data will be checked for completeness (no missing data fields) by the Rio Grande Return or NMED personnel before leaving the site and immediately scanned upon return from the field. All Electronic data including scanned documents will be transferred from laptops, cameras, and GPS units to Rio Grande Return computers. Once data has been transferred to Rio Grande Return computers, data will also be transferred to the SWQB Project Officer. The data will be transferred by Project Coordinator to SWQB Project Officer annually when field season data collection has been completed for the year. Typically, data transfer will be completed by late December of each field season. The SWQB Project Officer will back up all transferred data for redundancy.

3.0 ASSESSMENT AND OVERSIGHT

3.1 Assessment and Response Actions

Assessments and response actions will be reported as described below in 3.2. The SWQB Project Officer will provide project oversight by periodically assisting with and/or reviewing data collection efforts, twice per year during the life of the project. The Project Officer will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Any problems encountered during the course of this project will be immediately reported to the Project Officer who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the Project Officer will alert the QAO. If it is discovered that monitoring methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems and adjustments to the project plan will be documented in the project file and included in the final report.

3.2 Reports to Management

Quarterly reports are submitted by Rio Grande Return to the SWQB Project Officer and include progress of project implementation and any available data. Printouts, status reports or special reports for SWQB or EPA will be prepared upon request. Pollutant load reduction calculations will be made by NMED personnel. Separate annual monitoring reports, as required by the 404 permit, will be prepared by Rio Grande Return and provided to NMED and the CNF. The SWQB Project Officer will be responsible for maintaining project progress in the EPA Grants Reporting and Tracking System and final report, and all other required project deliverables to be submitted to the EPA under this grant.

4.0 DATA VALIDATION AND USABILITY

[6] https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/5.0-SOP-Physical-Habitat_Field_Sheets_20190826-MM.docx

4.1 Data Review, Verification and Validation

Data, whether collected by SWQB or others, will be considered usable if it has been collected in accordance with this QAPP and confirmed through verification and validation procedures. Rio Grande Return will complete and document the findings of the verification and validation procedures. The QAO is responsible for determining if the data was collected according to this QAPP and meets quality assurance requirements.

4.2 Verification and Validation Methods

Project data will be verified and validated according to the procedures described in the most current SWQB Verification and Validation (VV) SOP (https:/www.env.nm.gov/surface-water-quality/sop/). Only applicable procedures identified in the SWQB VV SOP will be used for this project. Verification and validation issues will be resolved by the Project Coordinator and the QAO. Results of the validation process will be conveyed using validation and verification worksheets (Appendix 6.1).

Verification issues include the completeness of the record, and verification of calibration. Validation issues include the review of the data for anomalous data points and removal of data points based on reasonable explanation.

4.3 Reconciliation with User Requirements

The data, if collected in accordance with this QAPP, will provide a high level of confidence in deciding whether the restoration activities in the Rio San Antonio watershed have increased riparian canopy and floodplain connectivity which in turn supports lowered water temperatures on Rio San Antonio.

If project results do not meet this requirement, then additional monitoring may be necessary to fill in data gaps or it may be necessary to extend the monitoring period to measure effects that were not apparent during the project period.

5.0 REFERENCES

NMED/SWQB 2018. Quality Assurance Project Plan for Water Quality Management Programs. New Mexico Environment Department/Surface Water Quality Bureau. https://www.env.nm.gov/surface-water-quality/qaqc/

NMED/SWQB, Monitoring, Assessment and Standards. 2004. US EPA-Approved TMDL for the Upper Rio Grande Watershed - Part 1. Html. https://www.env.nm.gov/surface-water-quality/tmdl/

NMED/SWQB 2019-2021. New Mexico Environment Department Standard Operating Procedures for Physical Habitat Measurements. SOP 5.0. Percent Canopy Effective September 17, 2019. https://www.env.nm.gov/surface-water-quality/sop/

NMED/SWQB 2020. Quality Management Plan for New Mexico Environment Department SWQB. Environmental Data Operations. https://www.env.nm.gov/surface-water-quality/qaqc/

Rosgen, Dave, Silvey Lee, 1996. Applied River Morphology. Wildland Hydrology. Pp. 5-2 to 5-34.

Rosgen, D. 2008. River Stability Field Guide. Wildland Hydrology. Pp. 2-1 – 2-51.

Harrelson et al. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique (General Techinical Report RM-235). United States Department of Agriculture Forest Service, Rocky Mountain Research Station.

Wheaton J.M., Bennett S.N., Bouwes, N., Maestas J.D. and Shahverdian S.M. (Editors). 2019. Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Version 1.0. Utah State University Restoration Consortium. Logan, UT. Available at: http://lowtechpbr.restoration.usu.edu/manual

6.0 APPENDIX

6.1 Data Verification and Validation Worksheet

Data Collected on [Date]	[Name] of Data Recorder & Data Collector	[Name/Type] of Collected Data	Verification of Complete Record [Y/N]	Instrument in working order [Y/N]	Checked for anomalous data [Y/N]	Validated by [name of reviewer]	Validated on [Date]

6.2 Acknowledgement Statement

New Mexico Environment Department Surface Water Quality Bureau

Stream Restoration on the Upper Rio San Antonio
Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the *Quality Assurance Project Plan for* Stream Restoration on the Upper Rio San Antonio .

As indicated by my signature below, I understand and acknowledge that it is my responsibility to read, understand, become familiar with and comply with the information provided in the document to the best of my ability.

_____
Signature

_____
Name (Please Print)

_____
Date
Return to SWQB Project Officer (Alan Klatt)